DOCUMENT RESUME

ED 356 905 PS 021 421

AUTHOR Pemberton, Elizabeth; And Others
TITLE Letter Reversals Produced and Recognized by Dyslexic and Nondyslexic Children.
PUB DATE 28 Mar 93
NOTE 13p.; Paper presented at the Biennial Meeting of the Society for Research in Child Development (60th, New Orleans, LA, March 25-28, 1993).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Children; Comparative Analysis; *Dyslexia; Elementary Education; Elementary School Students; *Freehand Drawing; *Language Handicaps; *Letters (Alphabet); *Manuscript Writing (Handlettering); Reading Difficulties; Word Recognition
IDENTIFIERS Normal Children; *Reversals (Reading)

ABSTRACT

The validity of the suggestion that dyslexic children make more letter reversal errors than other children was tested. Horizontal letter reversals of 8- to 11-year-old dyslexic children, nondyslexic speech- or language-impaired (SLI) children, and nonimpaired children in the context of individual letters, words, words spelled out letter-by-letter, and drawings incorporating letterlike shapes were examined. The results indicated that dyslexic children made significantly more errors than nondyslexic SLI and nonimpaired children in word production tasks but not word recognition tasks. When the letters were presented individually, the three groups did not differ in the number of reversals made. Results of the task that involved copying a drawing indicated that dyslexic children rarely reversed letters when they were embedded in drawings. The drawings of a person made by dyslexic children were no different in terms of structure and detail from drawings made by nonimpaired age-matched children. Letter reversals presented the greatest problem for dyslexic children in tasks in which the letters served a symbolic, specifically linguistic, function. (PAM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
X This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED356905

LETTER REVERSALS PRODUCED AND RECOGNIZED BY DYSLEXIC AND NONDYSLEXIC CHILDREN

Elizabeth Pemberton
Department of Educational Studies
University of Delaware

Brenda Buswell
University of Wisconsin-Madison

Michael Brennan
University of Iowa

Poster presentation at the 1993 SRCD Convention, March 28, New Orleans, Louisiana.

PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Elizabeth Pemberton
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC).

PS 021421

BEST COPY AVAILABLE

ABSTRACT

IT HAS LONG BEEN SUGGESTED THAT DYSLEXIC CHILDREN MAKE MORE LETTER REVERSAL ERRORS THAN OTHER CHILDREN, ALTHOUGH SURPRISINGLY FEW STUDIES HAVE COMPARED ERROR RATES ACROSS VARIOUS TASKS AND ACROSS VARIED SUBJECT POPULATIONS. IN THIS STUDY, HORIZONTAL LETTER REVERSAL ERRORS WERE EXAMINED IN THE CONTEXT OF INDIVIDUAL LETTERS, WORDS, WORDS SPELLED OUT LETTER-BY-LETTER, AND DRAWINGS INCORPORATING LETTER-LIKE SHAPES. THE GOAL WAS TO SEE IF DYSLEXIC 8-11 YEAR OLD CHILDREN REVERSED (OR OMITTED) MORE LETTERS THAN EITHER NON-DYSLEXIC SPEECH- AND/OR LANGUAGE-IMPAIRED (SLI) CHILDREN, OR NONIMPAIRED CHILDREN. RESULTS SHOWED THAT DYSLEXIC CHILDREN PRODUCED SIGNIFICANTLY MORE REVERSAL AND/OR OMISSION ERRORS THAN THE OTHER TWO GROUPS IN TASKS WHERE THEY WERE ASKED TO WRITE DOWN LETTERS FROM THE WORDS THEY HEARD READ OR SPELLED OUT ON TAPE. THERE WERE NO GROUP DIFFERENCES IN TASKS WHERE CHILDREN WERE ASKED TO RECOGNIZE REVERSED LETTERS. NOR WERE THE GROUPS DISTINGUISHED IN TASKS WHERE THEY WERE ASKED TO COPY DRAWINGS INCORPORATING LETTER-LIKE SHAPES. THE TENDENCY OF DYSLEXIC CHILDREN TO HORIZONTALLY REVERSE LETTERS APPEARS TO BE SPECIFIC TO LINGUISTIC PRODUCTION TASKS THAT INVOLVE WHOLE WORDS, OR WORDS SPELLED OUT LETTER BY LETTER.

LETTER REVERSALS PRODUCED AND RECOGNIZED BY DYSLEXIC AND NONDYSLEXIC CHILDREN

INTRODUCTION

CHILDREN WITH DEVELOPMENTAL DYSLEXIA (SPECIFIC NONACQUIRED READING IMPAIRMENT WITH NORMAL INTELLIGENCE) ARE BELIEVED TO REVERSE LETTERS IN PRINTING MORE OFTEN THAN OTHER CHILDREN, BUT SURPRISINGLY FEW STUDIES HAVE COMPARED DIFFERENT TASKS AND DIFFERENT CHILDREN TO TEST THIS CLAIM. THE PRESENT STUDY EXAMINES HORIZONTAL REVERSAL ERRORS (E.G., PRINTING d AS b) IN RECOGNIZING AND PRINTING THE FOLLOWING OFTEN-REVERSED LOWER-CASE ENGLISH LETTERS:

b d p q s y e h n u.

TASKS USED TO MEASURE LETTER-REVERSAL ERRORS

1) PRODUCTION OF LETTER REVERSALS

A) CHILD PRINTED 10 INDIVIDUAL LETTERS IN LOWER-CASE FROM AN AUDIOCASSETTE RECORDING:

b u d n p h q e s y

B) CHILD PRINTED 10 SIMPLE WORDS CONTAINING THESE 10 OFTEN REVERSED LETTERS, READ ON AN AUDIOCASSETTE:

cane, knob, yard, drip, bash, hobo, play, quit equal, soda

C) CHILD PRINTED THE SAME 10 WORDS AS THEY WERE SPELLED OUT LETTER-BY-LETTER ON AUDIOCASSETTE:

h-o-b-o, c-a-n-e, b-a-s-h, k-n-o-b, d-r-i-p, y-a-r-d, p-l-a-y, q-u-i-t, e-q-u-a-l, s-o-d-a

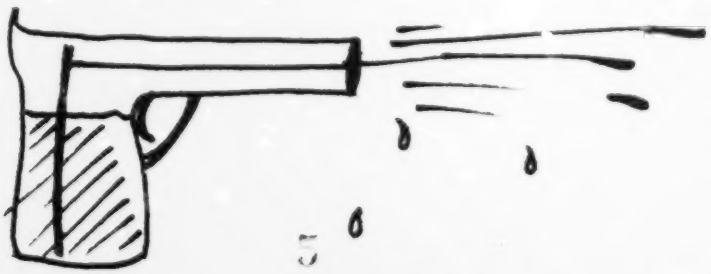
2) RECOGNITION OF LETTER REVERSALS

A) CHILD CIRCLED THOSE LETTERS "DRAWN WRONG" FROM TWO SETS OF 8 PRINTED LETTERS:

d u e ʏ s ᴖ b h

y p ᴝ ƨ n h q ɔ

B) CHILD CIRCLED THOSE LETTERS THAT WERE "DRAWN WRONG" WHICH WERE PARTS OF 20 DIFFERENT WORDS, e.g.,



squirt

TASKS, CONTINUED

3) CHILD COPIED 10 PREDRAWN FIGURES CONTAINING THE OFTEN-REVERSED LETTERS, e.g.,

ORIGINAL STIMULUS

CHILD'S COPY

4) CHILD DREW A PICTURE OF A PERSON

PREDICTIONS

1) ONE SPECIFIC PREDICTION WAS THAT DYSLEXIC CHILDREN WOULD OUTNUMBER THE TWO NONDYSLEXIC GROUPS IN TERMS OF REVERSAL ERRORS PRODUCED. PRODUCTION ERRORS INVOLVED REVERSING LETTERS IN PRINTING LETTERS OR WORDS THAT WERE PRESENTED ALOUD ON A CASSETTE TAPE. DYSLEXIC CHILDREN WERE EXPECTED TO PERFORM BELOW THE OTHER GROUPS IN TASKS WHERE THEY WERE ASKED TO RECOGNIZE WHETHER OR NOT LETTERS WERE REVERSED. A RECOGNITION ERROR INVOLVED SEEING A REVERSED PRINTED LETTER AS CORRECT, OR PERCEIVING A CORRECTLY ORIENTED LETTER AS INCORRECT.

2) A SECOND PREDICTION WAS THAT THE 3 GROUPS WOULD DIFFER IN TERMS OF LETTER-REVERSAL ERROR RATES ONLY WHEN THE LETTERS WERE PLACED IN THE CONTEXT OF WORDS, NOT INDIVIDUALLY. LETTER REVERSALS SHOULD BE MORE COMMON IN WORD CONTEXTS, WHERE THE LETTER SERVES A SYMBOLIC, LINGUISTIC FUNCTION, THAN WHEN PRESENTED INDIVIDUALLY.

3) IN LINE WITH THE SECOND PREDICTION, WE HYPOTHESIZED THAT LETTER-LIKE SHAPES WOULD NOT BE REVERSED WHEN THEY WERE EMBEDDED IN REPRESENTATIONAL DRAWINGS. PAST STUDIES HAVE SUGGESTED THAT REVERSALS ARE RARE IN DRAWING TASKS COMPARED TO LANGUAGE TASKS (E.G., LIBERMAN, 1985).

4) FINALLY, OVERALL DRAWING ABILITY OF THE 3 GROUPS OF CHILDREN WAS COMPARED. SOME PAST RESEARCH SUGGESTS THAT THE DRAWINGS OF DYSLEXICS ARE AS GOOD AS, IF NOT BETTER THAN, THE DRAWINGS OF NONIMPAIRED CHILDREN (E.G., ORTON, 1928, IN SYMMES, 1972). IF, IN FACT, DYSLEXIC CHILDREN DO DRAW WELL, AND IF THEY FAIL TO REVERSE LETTER-LIKE SHAPES IN DRAWING TASKS, PERHAPS DRAWING COULD BE USED AS AN AVENUE FOR OVERCOMING REVERSAL ERRORS IN PRINTING LETTERS.

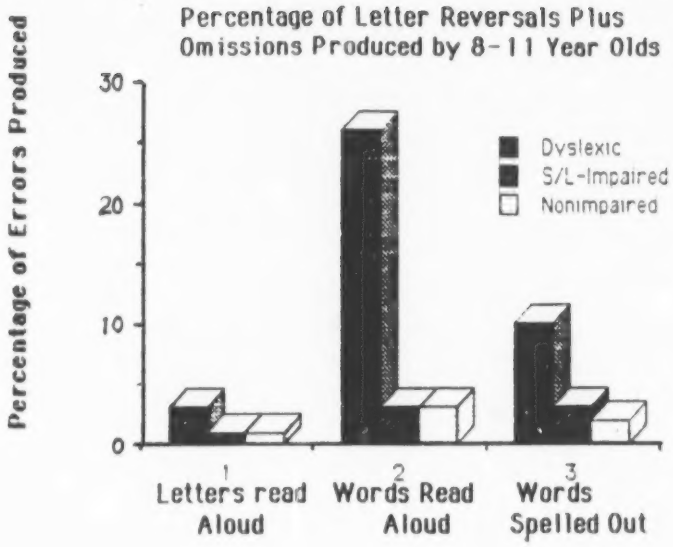
RESULTS

TO SUMMARIZE THE FINDINGS FROM THIS PRELIMINARY INVESTIGATION, DYSLEXIC CHILDREN DID MAKE SIGNIFICANTLY MORE ERRORS COMPARED TO NONDYSLEXIC SPEECH- AND/OR LANGUAGE-IMPAIRED (SLI) CHILDREN AND NONIMPAIRED (NI) CHILDREN IN WORD PRODUCTION TASKS, BUT NOT WORD RECOGNITION TASKS: $F(2,28)=16.85$, $p<.01$. THUS, PREDICTION 1 RECEIVED PARTIAL SUPPORT.

WHEN THE LETTERS WERE PRESENTED INDIVIDUALLY, THE 3 GROUPS DID NOT DIFFER IN THE NUMBER OF REVERSALS MADE: $F(2,28)=.64$, $p<.05$, IN KEEPING WITH PREDICTION 2. REVERSAL ERROR RATES WERE LOW FOR ALL 3 GROUPS IN THE SINGLE-LETTER CONDITION, SUPPORTING THE IDEA THAT ONLY WHEN THEY SERVE A SYMBOLIC, LINGUISTIC FUNCTION DO LETTERS GET REVERSED.

RESULTS OF THE DRAWING COPYING TASK SUGGEST THAT LETTERS ARE RARELY, IF EVER, REVERSED WHEN THEY ARE EMBEDDED IN DRAWINGS, IN LINE WITH PREDICTION 3. SUGGESTIONS FOR BETTER TASKS TO FURTHER TEST THIS CLAIM ARE GIVEN, INCLUDING THE IDEA OF USING SMALLER DRAWINGS AND ADDING A MEMORY COMPONENT TO THE TASK.

FINALLY, THE RESULTS SUGGEST THAT THE DRAWINGS OF A PERSON MADE BY DYSLEXICS ARE NO DIFFERENT IN TERMS OF STRUCTURE AND DETAIL FROM DRAWINGS MADE BY NONIMPAIRED AGE MATCHES. IN THIS SMALL STUDY, THE PERSON-DRAWING SCORES OF DYSLEXIC CHILDREN EXCEEDED THOSE OF SLI CHILDREN: $F(2,28)=4.27$, $p<.05$. MUCH MORE RESEARCH INTO THE ACTUAL PROCESS OF DRAWING NEEDS TO BE DONE BEFORE ANY FIRM CONCLUSIONS CAN BE MADE REGARDING USING DRAWINGS IN AN EDUCATIONAL AND/OR DIAGNOSTIC MANNER WITH DYSLEXIC CHILDREN.


Percentage of Letter Reversals Plus
Omissions Produced by 8-11 Year Olds
Percentage of Errors Produced
30
20
10
0
Dyslexic
S/L-Impaired
Nonimpaired
1
Letters read
Aloud
2
Words Read
Aloud
3
Words
Spelled Out

CONCLUSIONS

IN CONCLUSION, THIS RESEARCH SUPPORTS THE NOTION THAT DYSLEXIC CHILDREN REVERSE LETTERS IN A HORIZONTAL DIRECTION MORE OFTEN THAN DO NONDYSLEXIC SPEECH AND/OR LANGUAGE-IMPAIRED AND NONIMPAIRED AGE MATCHES. THIS FINDING HELD TRUE IN TASKS WHERE WORDS WERE READ ALOUD, BUT NOT WHEN LETTERS WERE PRESENTED INDIVIDUALLY. THE 3 GROUPS COULD NOT BE DISTINGUISHED IN TASKS WHICH REQUIRED THEM TO RECOGNIZE, RATHER THAN PRODUCE, HORIZONTAL LETTER REVERSALS. THE 3 GROUPS DID NOT DIFFER IN COPYING SIMPLE DRAWINGS WITH LETTER-LIKE SHAPES EMBEDDED IN THEM. DYSLEXIC CHILDREN PERFORMED AS WELL AS, IF NOT BETTER THAN, NONDYSLEXIC CHILDREN IN PERSON-DRAWING TASKS. IT APPEARS THAT LETTER REVERSALS PRESENT THE GREATEST PROBLEM FOR DYSLEXIC 8 TO 11 YEAR OLDS IN TASKS WHERE THE LETTERS SERVE A SYMBOLIC, SPECIFICALLY LINGUISTIC FUNCTION.

Liberman, I. Y. (1985). Should so-called modality preferences determine the nature of instruction for children with reading disabilities? In F. H. Duffy & N. Geschwind (Eds.), Dyslexia: A neuroscientific approach to clinical evaluation (pp. 93-103).

Symmes, J. S. (1972). Deficit models, spatial visualization and reading disability. Bulletin of the Orton Society, 22, 54-68.